

Summary of Causes/Fixes for Discrepancies in Bed Elevation Changes between the ST, OC, and CFT models

Issues that Have Been Addressed as of September 2013			
Issue	Concern	Status	Affects EPA runs also?
Discrepancies between the ST and OC models			
Missing record at day 15 in the HST coupling file (gcm_sedtran)	This shift in the time window caused solids fluxes and wet/dry flags to be mis-aligned in the OC and RCATOX models.	Fixed by HQI.	No (only impacted decoupled HST runs)
Discrepancies between the OC and CFT (RCATOX) models			
Inconsistencies in wetting/drying criteria The ST model used different wetting/drying criteria than the hydrodynamic model and RCATOX, when run in decoupled mode.	Contributes to RCATOX model having different solids fluxes than the ST model (affects intertidal cells only).	CPG changed ST model to use the same wetting/drying criteria as the hydrodynamic model and RCATOX.	No (only impacted decoupled HST runs)
Error in RCATOX wetting/drying behavior RCATOX allowed wet/dry flags to update during a coupling interval.	This behavior truncated the bed elevation changes for some OC-linkage coupling intervals. The truncation occurs because the solids fluxes stored in the coupling file are interpreted by RCATOX as averages over the entire coupling output interval (presently 15 minutes). Overall, this appears to have caused RCATOX intertidal cells to, on average, receive less deposition than ST predicts, in CPG model runs analyzed.	CPG changed RCATOX to not allow wet/dry flags to change during a single OC coupling interval, thus allowing the full solids flux for that coupling output interval to be applied within RCATOX.	Yes (intertidal cells only)

Notes:

RCATOX = the Contaminant Fate and Transport (CFT) Model

HST = Hydrodynamic and Sediment Transport

ST = Sediment Transport

OC = Organic Carbon

CPG = Cooperative Parties Group (Modeling Team)

EPA = Environmental Protection Agency

HQI = HydroQual Inc. (Modeling Team)

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Issues that Are Unresolved as of September 2013			
Issue	Concern	Status	Affects EPA runs also?
Discrepancies between the ST and OC Models			
Differing bulk density representations in ST and OC models <ul style="list-style-type: none"> • <u>ST</u>: Bulk density depends on bed initialization, depositional history, sediment type, and time-variable consolidation/unconsolidation. • <u>OC</u>: Recalculates bed thicknesses from solids mass fluxes, using different bulk density values for cohesive and non-cohesive solids. Bed bulk density is directly proportional to bed composition. 	<p>The model framework is unable to specify consistent bed elevation changes between the ST and OC/RCATOX models. The ST model should be the final arbiter of bed elevation changes.</p>	<p>CPG proposes the following solution:</p> <ul style="list-style-type: none"> • Pass ST bed elevation changes directly to the OC/RCATOX models. • Pass ST mean bulk density/composition values directly to the OC/RCATOX models, assuming instantaneous consolidation. This would be done for various vertical averaging intervals of interest. • The proposed correction avoids the complexities of representing consolidation within RCATOX, which is not needed for the simulation of longterm contaminant fate and transport (i.e., the timescale of interest to management questions). 	Yes
Discrepancies between the OC and CFT (RCATOX) Models			
The RCATOX model imposes an erosion “rate-limiter”¹ <p>The ST model’s erosion rate is reduced within RCATOX to ensure numerical stability by preventing depletion of the surface layer</p>	<ul style="list-style-type: none"> • The rate-limiter causes smaller erosion responses during large erosion events (high flow). • This issue only impacts a 	<p>CPG proposes the following solution:</p> <ul style="list-style-type: none"> • Monitor impact and address only as needed. 	Yes

¹ A similar rate-limiter also exists in EPA’s ST-SWEM but was eliminated in the OC linkage process implemented in the CPG’s runs.

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mass in one time step.	<ul style="list-style-type: none">• small number of cells during rare events.		
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